

AMENDMENTS TO THE CLAIMS

1-83. (Canceled)

84. (New) An infectious human-bovine chimeric parainfluenza virus (PIV) comprising a major nucleocapsid (N) protein, a nucleocapsid phosphoprotein (P), a large polymerase protein (L), and a partial or complete chimeric human PIV3 (HPIV3)-bovine PIV3 (BPIV3) genome or antigenome that comprises at least one gene segment encoding an open reading frame of a HN or F gene of a human PIV, said gene segment(s) being operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome;

said infectious chimeric PIV being attenuated for replication at least 10-fold in the respiratory tract of a primate host compared to wild type HPIV3.

85. (New) An infectious human-bovine chimeric parainfluenza virus (PIV) comprising a major nucleocapsid (N) protein, a nucleocapsid phosphoprotein (P), a large polymerase protein (L), and a partial or complete chimeric human PIV3 (HPIV3)-bovine PIV3 (BPIV3) genome or antigenome, in which said partial or complete PIV vector genome or antigenome comprises a polynucleotide encoding a wild-type L protein of the vector PIV;

said infectious chimeric PIV being attenuated for replication at least 10-fold in the respiratory tract of a primate host infected with said chimeric PIV compared to wild-type HPIV3.

86. (New) The infectious human-bovine chimeric PIV of claim 84, in which the partial or complete chimeric genome or antigenome further comprises a BPIV3 N gene or a polynucleotide comprising the open reading frame thereof operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome.

87. (New) The infectious human-bovine chimeric PIV of claim 86, in which the partial or complete chimeric genome or antigenome further comprises a P gene of human PIV3 or a polynucleotide comprising an open reading frame thereof and/or a L gene of human PIV3 or a

polynucleotide comprising an open reading frame thereof, said polynucleotide(s) encoding an open reading frame being operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome.

88. (New) The infectious human-bovine chimeric PIV of claim 85, in which the partial or complete chimeric genome or antigenome further comprises a BPIV3 N gene or a polynucleotide comprising the open reading frame thereof operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome.

89. (New) The infectious human-bovine chimeric PIV of claim 88, in which the partial or complete chimeric genome or antigenome further comprises a P gene of human PIV3 or a polynucleotide comprising the open reading frame thereof operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome.

90. (New) The infectious human-bovine chimeric PIV of claim 85, in which the partial or complete chimeric genome or antigenome further comprises at least one gene segment encoding an open reading frame of a HN or F gene of a human PIV operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome.

91. (New) The infectious human-bovine chimeric PIV of claim 88, in which the partial or complete chimeric genome or antigenome further comprises at least one gene segment encoding an open reading frame of a HN or F gene of a human PIV operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome.

92. (New) The infectious human-bovine chimeric PIV of claim 89, in which the partial or complete chimeric genome or antigenome further comprises at least one gene segment encoding an open reading frame of a HN or F gene of a human PIV operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome.

93. (New) The infectious human-bovine chimeric PIV of claim 84, in which the partial or complete chimeric genome or antigenome comprises at least one gene segment encoding an open reading frame of a human PIV HN gene operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome and at least one gene segment encoding an open reading frame of an F gene of a human PIV operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome.

94. (New) The infectious human-bovine chimeric PIV of claim 85, in which the partial or complete chimeric genome or antigenome comprises at least one gene segment encoding an open reading frame of a human PIV HN gene operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome and at least one gene segment encoding an open reading frame of a F gene of a human PIV operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome.

95. (New) The infectious human-bovine chimeric PIV of claim 88, in which the partial or complete chimeric genome or antigenome comprises at least one gene segment encoding an open reading frame of a human PIV HN gene operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome and at least one gene segment encoding an open reading frame of a F gene of a human PIV operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome.

96. (New) The infectious human-bovine chimeric PIV of claim 89, in which the partial or complete chimeric genome or antigenome comprises at least one gene segment encoding an open reading frame of a human PIV HN gene operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome and at least one gene segment encoding an open reading frame of a F gene of a human PIV operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome.

97. (New) The infectious human-bovine chimeric PIV of claim 84, in which the partial or complete chimeric genome or antigenome further comprises a bovine P gene or a polynucleotide encoding the open reading frame thereof operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome.

98. (New) The infectious human-bovine chimeric PIV of claim 85, in which the partial or complete chimeric genome or antigenome further comprises a bovine P gene or a polynucleotide encoding the open reading frame thereof operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome.

99. (New) The infectious human-bovine chimeric PIV of claim 98, in which the partial or complete chimeric genome or antigenome further comprises at least one gene segment encoding an open reading frame of a HN or F gene of a human PIV operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome.

100. (New) The infectious human-bovine chimeric PIV of claim 97, in which the partial or complete chimeric genome or antigenome further comprises at least one gene segment encoding an open reading frame of a human PIV HN gene operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome and at least one gene segment encoding an open reading frame of an F gene of a human PIV operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome.

101. (New) The infectious human-bovine chimeric PIV of claim 98, in which the partial or complete chimeric genome or antigenome further comprises at least one gene segment encoding an open reading frame of a human PIV HN gene operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome and at least one gene segment encoding an open reading frame of a F gene of a human PIV operably linked to regulatory sequences operable in said chimeric PIV genome or antigenome.

102. (New) The infectious human-bovine chimeric PIV of claim 84 in which the partial or complete chimeric genome or antigenome includes at least one mutation at a position corresponding to a mutation in the HPIV3_{cp45} selected from the group consisting of Val96 of the N protein, Ser389 of the N protein, Ile96 of the C protein, Ile420 of the F protein, Ala450 of the F protein, Val384 of the HN protein, Tyr942 of the L protein, Leu992 of the L protein, Thr1558 of the L protein, nucleotide 23 of the 3' leader sequence, nucleotide 24 of the 3' leader sequence, nucleotide 28 of the 3' leader sequence, nucleotide 45 of the 3' leader sequence and nucleotide 62 in the N gene start sequence.

103. (New) The infectious human-bovine chimeric PIV of claim 84 in which the partial or complete chimeric genome or antigenome comprises an L protein gene in which the L protein open reading frame is substituted by a human PIV L protein open reading frame that includes at least one mutation at a position corresponding to Tyr942 of the L protein of HPIV3, Leu992 of the L protein of HPIV3 and Thr1558 of the L protein of HPIV3.

104. (New) The infectious human-bovine chimeric PIV of claim 85 in which the partial or complete chimeric genome or antigenome includes at least one mutation at a position corresponding to a mutation in the HPIV3_{cp45} selected from the group consisting of Val96 of the N protein, Ser389 of the N protein, Ile96 of the C protein, Ile420 of the F protein, Ala450 of the F protein, Val384 of the HN protein, nucleotide 23 of the 3' leader sequence, nucleotide 24 of the 3' leader sequence, nucleotide 28 of the 3' leader sequence, nucleotide 45 of the 3' leader sequence and nucleotide 62 in the N gene start sequence.

105. (New) The infectious human-bovine chimeric PIV of claim 84 that further comprises a supernumerary gene comprising an open reading frame encoding a protein, or an antigenic portion thereof, from an additional virus.

106. (New) The infectious human-bovine chimeric PIV of claim 105, in which the supernumerary gene comprises a gene start sequence of HPIV3 or BPIV3 operably linked to an open reading frame encoding a protein or an antigenic portion thereof from said additional virus in turn operably linked to a gene end sequence of HPIV3 or BPIV3.

107. (New) The infectious human-bovine chimeric PIV of claim 85 that further comprises a supernumerary gene comprising an open reading frame encoding a protein, or an antigenic portion thereof, from an additional virus.

108. (New) The infectious human-bovine chimeric PIV of claim 107, in which the supernumerary gene comprises a gene start sequence of HPIV3 or BPIV3 operably linked to an open reading frame encoding a protein or an antigenic portion thereof from said additional virus in turn operably linked to a gene end sequence of HPIV3 or BPIV3.

109. (New) The infectious human-bovine chimeric PIV of claim 86 that further comprises a supernumerary gene comprising an open reading frame encoding a protein, or an antigenic portion thereof, from an additional virus.

110. (New) The infectious human-bovine chimeric PIV of claim 109, in which the supernumerary gene comprises a gene start sequence of HPIV3 or BPIV3 operably linked to an open reading frame encoding a protein or an antigenic portion thereof from said additional virus in turn operably linked to a gene end sequence of HPIV3 or BPIV3.

111. (New) The infectious human-bovine chimeric PIV of claim 87 that further comprises a supernumerary gene comprising an open reading frame encoding a protein, or an antigenic portion thereof, from an additional virus.

112. (New) The infectious human-bovine chimeric PIV of claim 111, in which the supernumerary gene comprises a gene start sequence of HPIV3 or BPIV3 operably linked to an

open reading frame encoding a protein or an antigenic portion thereof from said additional virus in turn operably linked to a gene end sequence of HPIV3 or BPIV3.

113. (New) The infectious human-bovine chimeric PIV of claim 88 that further comprises a supernumerary gene comprising an open reading frame encoding a protein, or an antigenic portion thereof, from an additional virus.

114. (New) The infectious human-bovine chimeric PIV of claim 113, in which the supernumerary gene comprises a gene start sequence of HPIV3 or BPIV3 operably linked to an open reading frame encoding a protein or an antigenic portion thereof from said additional virus in turn operably linked to a gene end sequence of HPIV3 or BPIV3.

115. (New) The infectious human-bovine chimeric PIV of claim 89 that further comprises a supernumerary gene comprising an open reading frame encoding a protein, or an antigenic portion thereof, from an additional virus.

116. (New) The infectious human-bovine chimeric PIV of claim 115, in which the supernumerary gene comprises a gene start sequence of HPIV3 or BPIV3 operably linked to an open reading frame encoding a protein or an antigenic portion thereof from said additional virus in turn operably linked to a gene end sequence of HPIV3 or BPIV3.

117. (New) An immunogenic composition comprising the infectious human-bovine chimeric PIV of any one of claims 84-86, 88, 90, 93, 94, 97, 98, 102-105 and 107.

118. (New) An isolated polynucleotide comprising a polynucleotide encoding a partial or complete chimeric human PIV3 (HPIV3)-bovine PIV3 (BPIV3) genome or antigenome that comprises at least one gene segment encoding an open reading frame of a HN or F gene of a human PIV, said gene segment(s) being operably linked to regulatory sequences operable in said chimeric genome or antigenome;

wherein a virus comprising a genome or antigenome comprising said polynucleotide is attenuated for replication by at least 10-fold compared to wild type HPIV3 in the respiratory tract of a primate.

119. (New) An isolated polynucleotide comprising polynucleotide encoding a partial or complete chimeric human PIV3 (HPIV3)-bovine PIV3 (BPIV3) genome or antigenome, in which said partial or complete chimeric genome or antigenome comprises a polynucleotide encoding a wild-type L protein of the vector PIV;

wherein a virus comprising a genome or antigenome comprising said polynucleotide is attenuated for replication by at least 10-fold compared to wild type HPIV3 in the respiratory tract of a primate.

120. (New) The isolated polynucleotide of claim 118, in which the partial or complete chimeric genome or antigenome further comprises a bovine N gene or a polynucleotide comprising the open reading frame thereof operably linked to regulatory sequences operable in said chimeric genome or antigenome.

121. (New) The isolated polynucleotide of claim 120, in which the partial or complete chimeric genome or antigenome further comprises a P gene of human PIV3 or a polynucleotide comprising an open reading frame thereof and/or a L gene of human PIV3 or a polynucleotide comprising an open reading frame thereof, said polynucleotide(s) encoding an open reading frame being operably linked to regulatory sequences operable in said chimeric genome or antigenome.

122. (New) The isolated polynucleotide of claim 119, in which the partial or complete chimeric genome or antigenome further comprises a bovine N gene or a polynucleotide comprising the open reading frame thereof operably linked to regulatory sequences operable in said chimeric genome or antigenome.

123. (New) The isolated polynucleotide of claim 122, in which the partial or complete chimeric genome or antigenome further comprises a P gene of human PIV3 or a polynucleotide comprising the open reading frame thereof operably linked to regulatory sequences operable in said chimeric genome or antigenome.

124. (New) The isolated polynucleotide of claim 119, in which the partial or complete chimeric genome or antigenome further comprises at least one gene segment encoding an open reading frame of a HN or F gene of a human PIV operably linked to regulatory sequences operable in said chimeric genome or antigenome.

125. (New) The isolated polynucleotide of claim 122, in which the partial or complete chimeric genome or antigenome further comprises at least one gene segment encoding an open reading frame of a HN or F gene of a human PIV operably linked to regulatory sequences operable in said chimeric genome or antigenome.

126. (New) The isolated polynucleotide of claim 123, in which the partial or complete chimeric genome or antigenome further comprises at least one gene segment encoding an open reading frame of a HN or F gene of a human PIV operably linked to regulatory sequences operable in said chimeric genome or antigenome.

127. (New) The isolated polynucleotide of claim 118, in which the partial or complete chimeric genome or antigenome further comprises at least one gene segment encoding an open reading frame of a human PIV HN gene operably linked to regulatory sequences operable in said chimeric genome or antigenome and at least one gene segment encoding an open reading frame of an F gene of a human PIV operably linked to regulatory sequences operable in said chimeric genome or antigenome.

128. (New) The isolated polynucleotide of claim 119, in which the partial or complete chimeric genome or antigenome further comprises at least one gene segment encoding an open

reading frame of a human PIV HN gene operably linked to regulatory sequences operable in said chimeric genome or antigenome and at least one gene segment encoding an open reading frame of a F gene of a human PIV operably linked to regulatory sequences operable in said chimeric genome or antigenome.

129. (New) The isolated polynucleotide of claim 122, in which the partial or complete chimeric genome or antigenome further comprises at least one gene segment encoding an open reading frame of a human PIV HN gene operably linked to regulatory sequences operable in said chimeric genome or antigenome and at least one gene segment encoding an open reading frame of a F gene of a human PIV operably linked to regulatory sequences operable in said chimeric genome or antigenome.

130. (New) The isolated polynucleotide of claim 123, in which the partial or complete chimeric genome or antigenome further comprises at least one gene segment encoding an open reading frame of a human PIV HN gene operably linked to regulatory sequences operable in said chimeric genome or antigenome and at least one gene segment encoding an open reading frame of a F gene of a human PIV operably linked to regulatory sequences operable in said chimeric genome or antigenome.

131. (New) The isolated polynucleotide of claim 118, in which the partial or complete chimeric genome or antigenome further comprises a bovine P gene or a polynucleotide encoding an open reading frame thereof operably linked to regulatory sequences operable in said chimeric genome or antigenome.

132. (New) The isolated polynucleotide of claim 119, in which the partial or complete chimeric genome or antigenome further comprises a bovine P gene or a polynucleotide encoding an open reading frame thereof operably linked to regulatory sequences operable in said chimeric genome or antigenome.

133. (New) The isolated polynucleotide of claim 132, in which the partial or complete chimeric genome or antigenome further comprises at least one gene segment encoding an open reading frame of a HN or F gene of a human PIV operably linked to regulatory sequences operable in said chimeric genome or antigenome.

134. (New) The isolated polynucleotide of claim 131, in which the partial or complete chimeric genome or antigenome further comprises at least one gene segment encoding an open reading frame of a human PIV HN gene operably linked to regulatory sequences operable in said chimeric genome or antigenome and at least one gene segment encoding an open reading frame of an F gene of a human PIV operably linked to regulatory sequences operable in said chimeric genome or antigenome.

135. (New) The isolated polynucleotide of claim 132, in which the partial or complete chimeric genome or antigenome further comprises at least one gene segment encoding an open reading frame of a human PIV HN gene operably linked to regulatory sequences operable in said chimeric genome or antigenome and at least one gene segment encoding an open reading frame of a F gene of a human PIV operably linked to regulatory sequences operable in said chimeric genome or antigenome.

136. (New) The isolated polynucleotide of claim 118 in which the partial or complete chimeric genome or antigenome includes at least one mutation at a position corresponding to a mutation in the HPIV3_{cp45} selected from the group consisting of Val96 of the N protein, Ser389 of the N protein, Ile96 of the C protein, Ile420 of the F protein, Ala450 of the F protein, Val384 of the HN protein, Tyr942 of the L protein, Leu992 of the L protein, Thr1558 of the L protein, nucleotide 23 of the 3' leader sequence, nucleotide 24 of the 3' leader sequence, nucleotide 28 of the 3' leader sequence, nucleotide 45 of the 3' leader sequence and nucleotide 62 in the N gene start sequence.

137. (New) The isolated polynucleotide of claim 118 in which the partial or complete chimeric genome or antigenome comprises an L protein gene in which the L protein open reading frame is substituted by a human PIV L protein open reading frame that includes at least one mutation at a position corresponding to Tyr942 of the L protein of HPIV3, Leu992 of the L protein of HPIV3 and Thr1558 of the L protein of HPIV3.

138. (New) The isolated polynucleotide of claim 118 that further comprises a supernumerary gene comprising an open reading frame encoding a protein, or an antigenic portion thereof, from an additional virus.

139. (New) The isolated polynucleotide of claim 138, in which the supernumerary gene comprises a gene start sequence of HPIV3 or BPIV3 operably linked to an open reading frame encoding a protein or an antigenic portion thereof from said additional virus in turn operably linked to a gene end sequence of HPIV3 or BPIV3.

140. (New) The isolated polynucleotide of claim 119 that further comprises a supernumerary gene comprising an open reading frame encoding a protein, or an antigenic portion thereof, from an additional virus.

141. (New) The isolated polynucleotide of claim 140, in which the supernumerary gene comprises a gene start sequence of HPIV3 or BPIV3 operably linked to an open reading frame encoding a protein or an antigenic portion thereof from said additional virus in turn operably linked to a gene end sequence of HPIV3 or BPIV3.

142. (New) The isolated polynucleotide of claim 120 that further comprises a supernumerary gene comprising an open reading frame encoding a protein, or an antigenic portion thereof, from an additional virus.

143. (New) The isolated polynucleotide of claim 142, in which the supernumerary gene comprises a gene start sequence of HPIV3 or BPIV3 operably linked to an open reading frame encoding a protein or an antigenic portion thereof from said additional virus in turn operably linked to a gene end sequence of HPIV3 or BPIV3.

144. (New) The isolated polynucleotide of claim 121 that further comprises a supernumerary gene comprising an open reading frame encoding a protein, or an antigenic portion thereof, from an additional virus.

145. (New) The isolated polynucleotide of claim 144, in which the supernumerary gene comprises a gene start sequence of HPIV3 or BPIV3 operably linked to an open reading frame encoding a protein or an antigenic portion thereof from said additional virus in turn operably linked to a gene end sequence of HPIV3 or BPIV3.

146. (New) The isolated polynucleotide of claim 122 that further comprises a supernumerary gene comprising an open reading frame encoding a protein, or an antigenic portion thereof, from an additional virus.

147. (New) The isolated polynucleotide of claim 146, in which the supernumerary gene comprises a gene start sequence of HPIV3 or BPIV3 operably linked to an open reading frame encoding a protein or an antigenic portion thereof from said additional virus in turn operably linked to a gene end sequence of HPIV3 or BPIV3.

148. (New) The isolated polynucleotide of claim 123 that further comprises a supernumerary gene comprising an open reading frame encoding a protein, or an antigenic portion thereof, from an additional virus.

149. (New) The isolated polynucleotide of claim 148, in which the supernumerary gene comprises a gene start sequence of HPIV3 or BPIV3 operably linked to an open reading frame

encoding a protein or an antigenic portion thereof from said additional virus in turn operably linked to a gene end sequence of HPIV3 or BPIV3.

150. (New) A method for making a human-bovine chimeric PIV, comprising expressing the isolated polynucleotide of claim 118 or 119 in a cell or in a cell-free lysate, said cell or cell-free lysate comprising a major nucleocapsid (N) protein, a nucleocapsid phosphoprotein (P) and a large polymerase protein (L) of a human or bovine PIV.

151. (New) The method of claim 150, in which one or more of the N, P and L proteins are expressed from at least one polynucleotide vector separate from the isolated polynucleotide encoding the complete or partial chimeric genome or antigenome.

152. (New) An expression vector comprising in operative linkage i) a promoter operative in a mammalian cell or operative *in vitro*;

ii) a polynucleotide of any one of claims 118-122, 124, 127, 128, 131, 132, 136-138 and 140;

iii) a transcription terminator sequence operative in a mammalian cell or operative *in vitro*.

153. (New) The infections human-bovine chimeric PIV of claim 105, wherein additional virus is a respiratory syncytial virus.

154. (New) The infections human-bovine chimeric PIV of claim 107, wherein additional virus is a respiratory syncytial virus.

155. (New) The infections human-bovine chimeric PIV of claim 109, wherein additional virus is a respiratory syncytial virus.

156. (New) The infections human-bovine chimeric PIV of claim 111, wherein additional virus is a respiratory syncytial virus.

157. (New) The infections human-bovine chimeric PIV of claim 113, wherein additional virus is a respiratory syncytial virus.

158. (New) The isolated polynucleotide of claim 138, wherein the additional virus is a respiratory syncytial virus.

159. (New) The isolated polynucleotide of claim 140, wherein the additional virus is a respiratory syncytial virus.

160. (New) The isolated polynucleotide of claim 142, wherein the additional virus is a respiratory syncytial virus.

161. (New) The isolated polynucleotide of claim 144, wherein the additional virus is a respiratory syncytial virus.

162. (New) The isolated polynucleotide of claim 146, wherein the additional virus is a respiratory syncytial virus.

163. (New) The isolated polynucleotide of claim 148, wherein the additional virus is a respiratory syncytial virus.